**Condition Change: UC ANR contributed to increased water supply security**

**Issue**

California’s climate has the largest precipitation and streamflow variability in the contiguous United States. Groundwater pumping chronically exceeds natural recharge in many agricultural regions of the state; in fact, statewide groundwater overdraft estimates range from 500,000 to 1.5 million acre feet per year. The Sustainable Ground Water Management Act in California will require that pumping be reduced to bring recharge and extraction of groundwater back into parity. Failure of water users to achieve targets could lead to court adjudication which would further limit pumping and potentially the amount of land that can be farmed. Identifying new ways to ensure and secure a safe water supply are essential to the health and prosperity of California.

**Methods**

UC ANR extends new knowledge using both real and virtual methods to increase understanding of groundwater resources and conservation.

UC Agriculture Experiment Station scientists at the UC Davis location are investigating methods to better understand and improve groundwater management.  For example, scientists are using tools to collect data and model groundwater systems (Thomas Harter and Graham Fogg). Other projects are assessing the use of storm and flood water on agricultural lands to improve groundwater recharge. The work has expanded to include almonds, alfalfa, vineyards and irrigated pastures (Helen Dahlke, Larry Williams, and Daniel Putnam).

In 2019, University of California Cooperative Extension (UCCE) scientists shared several tools with water agencies, and engaged with policy-makers to improve practices and decision-making. Scientists developed applied tools to support water management decisions. Specifically one team developed simulation and optimization models, cost-benefit analysis, and risk analysis to identify strategies that improve water management in light of current water allocation, climate change, and aged infrastructure (Sam Sandoval). Other scientists shared a report entitled "Managing Drought in a Changing Climate" with leaders in the water community and gubernatorial and legislative staff (Ted Grantham).

In another example, a UCCE scientist teamed up with UC Davis collaborators to produce decision-support criteria to improve the investments made by water regulators and managers in California. The goal was to provide the State Water Resources Control Board with a comprehensive, yet simple economic model that they could use to make more informed decisions regarding water loss performance standards required by state law SB 555. Additionally, analysis of the potential impacts of the state's Sustainable Groundwater Management Act (SGMA) and the merits of different management actions was extended to water managers, farmers, state and local representatives, and community organizations (Ellen Bruno, Katrina Jessoe, Frank Loge).

As a result of UC ANR research, outreach, and education, participants learned and adopted practices that lead to increased water supply security. Outcomes with specific measured indicators follow.

**Outcomes**

**Science-based research is applied to water supply policy and planning.**

* Recommendations from the UC ANR "Managing Drought in a Changing Climate", report have been incorporated in the Governor's 2020 Water Resilience Portfolio. (Ted Grantham)
* The UC ANR economic model and analysis directly informed the performance standards that are currently being established by the State Water Resources Control Board under SB 555. These performance standards will be imposed on the largest 400 urban water utilities across the state. (Ellen Bruno)
* The Community Water Center and the Environmental Defense Fund were able to use the analysis of SGMA impacts to determine their policy stances towards groundwater trading and make informed decisions about the allocation of water resources in California. (Ellen Bruno)
* Pajaro Valley Water Management Agency and the Russian River Flood Control District adopted practices based on the UCCE applied research and findings that will increase water supply reliability. (Sam Sandoval)

These measured outcomes strengthened understanding of water supply and helped improve the actions taken to ensure a stable water supply to meet California’s demand. UC ANR research and extension supports communities as they develop groundwater management plans to bring pumping and recharge into balance by 2042 in compliance with the state’s Sustainable Groundwater Management Act. Thus, UC ANR contributes to the public value of protecting California’s natural resources.